

lesson 7: it all makes sense

estimated time

1½–2 hours

science GLEs

EC.1.A.4.a. Identify the ways a specific organism may interact with other organisms or with the environment (e.g., pollination, shelter, seed dispersal, camouflage, migration, hibernation, defensive mechanism)

vocabulary

Pollinators

Disperse

Digestive tract

Defense mechanisms

lesson objectives

1. Explain why organisms need to interact with other organisms and their environment.
2. Identify ways specific organisms interact with other organisms and the environment, such as seed dispersal, pollination, camouflage and defense mechanisms.
3. List human interactions with their environments.
4. Explain how these human interactions may affect the environment and the organisms in the environment/ecosystem.

essential questions for the lesson

1. Why do organisms interact with each other and the environment?
2. How do organisms, including humans, interact with other organisms and their environment?

teacher notes

Students should have read Chapter 7, “It All Makes Sense,” pages 32–35 in their student books prior to engaging in these activities.

outline of answers to objectives

See following page.

essential activities

Activity 7.1: What’s the Big Deal About Interaction?

Activity 7.2: Bird Interaction—Survival! Survival! Survival!

Activity 7.3: Human Interactions

optional activities

Optional Activity 7.A: Oh, Deer! (Project WILD)

Note: For teachers who have completed a Project WILD workshop, the activity titled *Oh, Deer!* has an excellent extension activity involving several populations of animals in one area and their interactions as predator and/or prey.

summary

Organisms interact with other organisms and the environment by seed dispersal, pollination, camouflage and defense mechanisms. A decrease in prey populations can cause a decrease in predator populations. A decrease in predator populations can cause an increase in prey populations. Different organisms survive in a given environment because they have special structures or behaviors. Humans are part of the picture, too.

outline of answers to objectives—lesson 7

1. Explain why organisms need to interact with other organisms and their environment. (page 32)
 - a. Organisms need to interact with other organisms and their environment to survive.
2. Identify ways specific organisms interact with other organisms and the environment, such as seed dispersal, pollination, camouflage and defense mechanisms. (pages 32–35)
 - a. Pollination—Examples
 - 1) Plants depend upon bees, butterflies and other insect pollinators to transfer pollen from one flower to the next. Pollination is necessary for the plants to develop fruits and seeds, which eventually grow into new plants. These plants will be food for omnivores and herbivores.
 - 2) Bumble bees gather nectar for food from prairie coneflowers. Each coneflower benefits because bees leave behind bits of pollen that they have collected in their pollen baskets from other coneflowers.
 - b. Shelter—Examples
 - 1) Frogs and toads lay eggs in pond water and when the eggs hatch, the young find safety and food among the pond plants.
 - 2) Dragonflies lay eggs on stems of pond plants and when the eggs hatch, the young find safety and food among the pond plants.
 - 3) Some animals living in forests and prairies find shelter and food among the roots, leaves and flowers of plants and trees.
 - 4) Animals use plants as places to nest and raise their young. Quail use prairies with both brushy areas and woodland edges to nest and raise their young and survive harsh winters.
 - 5) Prairie racerunners may use rocks for shelter.
 - 6) Big brown bats use hollow trees, deep rock crevices, buildings, caves and other places to roost and hibernate.
 - 7) Fallen leaves from trees and other plants blanket the forest floor and create a layer of safety and warmth for other plants and small animals.
 - 8) Thick clumps of prairie grass make perfect shelters, nesting spots and travel lanes for rodents, birds and snakes.
 - c. Seed dispersal—Many plants depend on the wind or animals to move or disperse their seed. Examples:
 - 1) Seeds with wing-like parts spin down from the trees.
 - 2) Seeds with soft, fuzzy coverings are light enough to float away on the breeze.
 - 3) Seeds with sticky or prickly surfaces cling to animal fur and hitch a ride until they fall off or are scratched off. Where they land is where they can germinate and grow.
 - 4) Some plant seeds must be eaten and pass through an animal's digestive tract before they will grow. Migrating waxwings eat cedar seeds. When the seeds pass through the digestive system, they are dropped along the waxwings' migration route, where many will grow.
 - d. Camouflage—Examples:
 - 1) Newborn deer have white spots on their brown fur that allow the fawns to blend into their forest surroundings.
 - 2) Thirteen-lined ground squirrels, greater prairie-chickens, ornate box turtles and bullsnakes are prairie animals with stripes, spots and bands of light and dark colors that help them blend into their prairie environment.
 - e. Defense mechanisms—Examples:
 - 1) Venomous snakes and spiders use venom to protect themselves and to make their live food hold still.
 - 2) Skunks, daddy longlegs and certain snakes and insects have glands that give off such foul smells that other animals leave them alone.
 - 3) Specialized feet, tails and body shapes allow animals to run, jump and climb to escape other animals or to capture them.
 - 4) Speed is the greatest defense mechanism prairie racerunners have to escape predators. Their long stripes help keep predators wondering which way the speedy lizard is racing.
 - f. Predator and prey interaction
 - 1) Balance is the key to healthy ecosystems.
 - a) Ecosystems may become unbalanced when populations of plants or animals become too large or too small as a result of droughts, floods or diseases.
 - b) Balanced populations depend on an environment having enough food for all the animals as well as the right number of animals to eat the food.

- 2) When population numbers change, the balance between predator and prey changes.
 - a) If bobcat populations suddenly became smaller, there would be fewer predators to eat rabbits. In a short time the rabbit population would increase and consume too many plants. With fewer plants, eventually rabbits and other plant consumers would not have the food they need to survive.
- g. Other interactions—Examples
 - 1) A hungry animal will forage for plants or hunt for other animals for food.
 - 2) Prairie racerunners use flat rocks to warm up or cool down.
 - 3) Herbivores and omnivores depend on plants for food.
 - 4) Decomposers are essential to all animals and plants. They clean up scat and dead plants and animals by breaking them down and returning them back to the soil as nutrients. Examples:
 - a) Forest: sowbugs, carpenter ants, termites, beetles, fungi and bacteria
 - b) Prairie: microorganisms (organisms too small to be seen without a microscope)
3. Identify examples where human activities caused beneficial or harmful changes to the ecosystem.

See *Activity 7.3: Human Interactions*.

 - a. When humans dig up large numbers of wildflowers from a prairie they are removing essential pieces of the prairie ecosystems. Rabbits, butterflies, birds and other herbivores that depend on the forbs for food and shelter may have more difficulty surviving. This in turn means that bobcats, coyotes, hawks and other predators that depend on those herbivores for food are affected.
 - b. Taking fish smaller than the legal length limit reduces the number of fish old enough to reproduce.
 - c. Riding an ATV through forests can damage plants and homes of burrowing or ground-nesting animals.
 - d. Dumping trash, or littering, is ugly. It can also be a health hazard for humans and other animals.

activity 7.1 : what's the big deal about interaction?

estimated time 30 minutes

objectives

Students will be able to

1. Explain why organisms need to interact with other organisms and their environment.
2. Identify ways specific organisms interact with other organisms and the environment, such as seed dispersal, pollination, camouflage and defense mechanisms.

teacher preparation

Students should have read Chapter 7, "It All Makes Sense," pages 32–35 in their student books prior to engaging in these activities.

This is an outdoor activity. Take a brief walk around the schoolyard and note where you find examples of organisms interacting with each other and with the non-living things in the schoolyard (hunting; being hunted; sunning; moving from flower to flower; waiting by a flower to eat animals coming to the flower; birds eating birdseed from the students' feeders or eating insects; etc.). During the course of the activity, if students are unsure and/or unable to find examples, refer to your notes and provide subtle prompts for students to discover examples.

materials

Science notebooks	Hand lenses/loupes	Field guides (optional)
Pencils	Thermometers	

procedure

1. Have students complete their science notebook headings and take and record outside air temperature.
2. Have students work individually to list in their science notebooks the "organisms" that live in their own homes. For example:
 - a. humans (parents; sisters; brothers; uncles; grandmother; etc.)
 - b. pets (dogs; cats; parakeets; etc.)
 - c. plants (Mom's kitchen herbs over the sink; plants in the windows; etc.)
 - d. pests (flies; mice; spiders; mosquitoes; etc.)

Q. How do the organisms you have listed interact with each other?

- a. Parents provide food, water, shelter, space to children.
- b. Children provide pets with food, water, shelter and space.
- c. Humans provide plants with water, nutrients and light.
- d. Plants give off oxygen and provide air to the humans and pets.
- e. Humans try to get rid of pests, such as mosquitoes and flies, because they can be very annoying and could possibly carry disease and harm the other organisms in the home.
- f. Pests (mosquitoes) use the humans as food or take advantage of humans because they make food available (crumbs, fruit left out, etc. for flies and mice).

Q. What purpose do all these interactions serve?

- A. It's all about survival. Even these interactions occurring every day at home serve to help each organism find or receive what it needs to survive.
3. Instruct students to spend time observing their schoolyard ecosystem and record interactions they see occurring between organisms. Students may use hand lenses or loupes for close-up observations. Instruct students to watch especially for examples of interactions involving seed dispersal, pollination, camouflage, predator/prey and defense mechanisms.
 4. Discuss the interactions observed and ask students how each interaction was somehow connected to at least one organism using another to survive.

wrap-up/formative assessment See *Wrap-Up/Formative Assessments* in the Teacher Notes section of the introductory material to choose a strategy that meets student needs.

activity 7.2 : bird interaction— survival! survival! survival!

estimated time 30–40 minutes

objectives

Students will be able to

1. Explain why birds need to interact with other organisms and their environment.
2. Identify ways specific birds interact with other organisms and the environment, such as seed dispersal, camouflage and defense mechanisms.

teacher preparation

Bird feeders should have been filled at least fifteen minutes to one-half hour before the activity.

This is an outdoor activity. Take a brief walk around the schoolyard and note bird activity and behavior. During the course of the activity, if students are unsure and/or unable to find examples of bird activity and behavior, refer to your notes and provide subtle prompts for students to discover examples.

Activity 7.2 incorporates many of the concepts from prior lessons and will focus on the bird feeders and on the birds using them that students have been studying throughout the unit. Time allowed for students to observe bird behavior should be determined by student interest level and ability to remain focused and on-task.

materials

Science notebooks

Pencils

Thermometers

Field guides (optional)

Binoculars (optional)

procedure

1. Have students complete their science notebook headings and take and record outside air temperature.
2. Instruct students to quietly observe their bird feeders and record bird activity, behavior and interactions:
 - a. Birds interacting with other birds. Why?
 - b. Birds interacting with plants. Why?
 - c. Birds interacting with non-living things in the schoolyard ecosystem or in their immediate environment. Why?
 - d. Bird behavior observed that is a reaction to internal and/or external cues. How could you tell?
3. Have students share and discuss their observations. Challenge them to draw conclusions as to why birds were observed doing certain activities:
 - a. Were birds competing for food at the feeders and displaying aggressive behavior to other birds to scare them away? Were those other birds reacting to an internal cue of fear and flew away as a defense mechanism?
 - b. Were birds at plants because they were eating parts of the plants, were they hunting insects that were on/in the plants, or were they just resting on the plants?
 - c. Were birds at the fountain/bird bath/pond because they were reacting to external cues of hot temperatures or internal cues of thirst, or were they eating insects/plants in or near the water?
 - d. Were there birds that were more camouflaged than others? Describe their behavior compared to the brightly colored, very visible birds. Were there differences/similarities?
 - e. Were birds engaged in any form of seed dispersal? Were there birds eating seed that had been tossed about and dropped from the feeders by other birds? That's one form of dispersal. Were other birds taking one seed at a time from the feeder and flying off somewhere else to eat it? Why?

Q. All of these behaviors and interactions observed provided what for these birds?

A. Some form of safety, shelter, food, water and space, which means these birds were interacting in order to survive.

Q. Were there any birds observed doing anything that would not have been a survival technique?

A. Answers will vary, but everything should point to survival including birds that were resting or sleeping.

wrap-up/formative assessment

Have students write a brief paragraph describing one internal or external cue they experienced personally, how they reacted to that cue, and why or why not was their reaction helpful to their survival. (Ex: fear—ran away—wasn't bitten by a mean dog or wasn't beaten up by a neighborhood bully; hunger—ate a snack—didn't starve; extreme cold—put on gloves, heavier coat and hat—was able to continue shoveling the driveway so parents could drive to the store for food; etc.)

activity 7.3 : human interactions

estimated time 20–30 minutes

objectives

Students will be able to

1. List human interactions with their environments.
2. Explain how these human interactions may effect the environment and the organisms in the environment/ecosystem.

teacher preparation

This is an outdoor activity. Take a brief walk around the schoolyard and note where you find examples of human interactions with the schoolyard ecosystem. During the course of the activity, if students are unsure and/or unable to find examples, refer to your notes and provide subtle prompts for students to discover examples.

This activity will involve simple, introductory discussions based on the pictures on page 35 of the student book. Students will use the schoolyard ecosystem for examples of human interactions. The terms “harmful effects” and “beneficial effects” are not officially introduced until Chapter 8. However, this simple brainstorming activity does not necessarily require introducing those terms here. Lists generated by students in this activity will be tied in closely with *Activity 8.1*, and the terms “harmful effects” and “beneficial effects” will be introduced there.

If students should focus on harmful effects caused by human interactions, allow them to do so. Capture the information on the flip chart. Activity 8.1 will balance the harmful effects of human interactions with beneficial effects of human interactions.

materials

Science notebooks

Pencils

Thermometers

Student books

procedure

1. Have students complete their science notebook headings and take and record outside air temperature.
2. Have students work in groups to come up with a list of ways humans interact with environments and the possible effects these interactions have on those environments. Record students’ list items on a flip chart for later use in *Activity 8.1*. Ex: People litter; write graffiti; poach deer, turkeys, fish, etc.; dig up wildflowers; drive ATVs through streams and off trails in forests; plant flowers; feed birds; etc.
3. Instruct students to read the information on page 35 of their student book and to look carefully at the pictures on that page. Have them share any effects they see on the page not already on the flip chart list.
Q. What are possible effects caused by the interactions on your list?
A. Answers will vary but could include:
 - a. Human digging up wildflowers—When humans remove parts of the ecosystem that other animals/organisms depend on for survival, they affect the organisms that depend directly on the wildflowers for food and shelter and they affect the organisms that depend on other organisms for food.
 - b. Human riding an ATV through a stream/forest—ATVs can cause damage to plants and to the homes of organisms. ATVs can cause damage to organisms that live in the streams.
 - c. Humans leaving trash and litter—Litter and trash make a place look ugly. Litter is ugly and can cause health hazards for humans and other organisms.
 - d. Humans might take more fish/wrong size fish than is allowed by the regulations—Taking too many fish reduces the fish population. Taking fish smaller than the legal length limit reduces the number of fish old enough to reproduce.
4. Instruct students to take note of some effects they see in their schoolyard ecosystem that are the result of human interactions (ex: trash, bird feeders torn down, people wearing down grass or walking through flower gardens to take a short cut).

5. Have students share these so that they may be recorded on the flip chart for inclusion in *Activity 8.1*.

wrap-up/formative assessment See *Wrap-Up/Formative Assessments* in the Teacher Notes section of the introductory material to choose a strategy that meets student needs.

so, what do you know?—lesson 7

1. Why do organisms need to interact with other organisms and their environment?
2. When bees and butterflies go from one flower to the next they are interacting with other living things. What is this type of interaction called?
 - a. Pollination
 - b. Predation
 - c. Defense mechanism
 - d. Preying on flowers
3. What is one way prairie racerunners interact with flat rocks?
 - a. They use them to raise their young.
 - b. They use them as raceways.
 - c. They use them to warm up or cool down.
 - d. They use them to kill their prey.
4. Where can forest animals find shelter?
5. Why is it important to maintain predator/prey balance in an ecosystem?
6. Predict what might happen to the coyote population in the following scenario.

In the prairie ecosystem, coyotes rely on rabbits and other small mammals for food. The spring and summer months have been very, very wet. So wet, in fact, that about 50% of the young rabbit population has drowned.

so, what do you know?—lesson 7

answer key

1. Why do organisms need to interact with other organisms and their environment? (1 point)

answer —To survive

2. When bees and butterflies go from one flower to the next they are interacting with other living things. What is this type of interaction called? (1 point)

answer —a. Pollination

3. What is one way prairie racers interact with flat rocks? (1 point)

answer —c. They use them to warm up or cool down.

4. Where can forest animals find shelter? (2 points for any one of the answers provided)

possible answers

- Among the roots, leaves and flowers of plants
- Among the fallen leaves, sticks, rocks, etc., on the forest floor
- Other answers may be acceptable

5. Why is it important to maintain predator/prey balance in an ecosystem? (2 points)

answer

- Predator/prey balance is key to healthy ecosystems.
- Or other similarly-worded content

6. Predict what might happen to the coyote population in the following scenario.

In the prairie ecosystem, coyotes rely on rabbits and other small mammals for food. The spring and summer months have been very, very wet. So wet, in fact, that about 50% of the young rabbit population has drowned.

possible answers (4 points for one plausible answer)

- The coyote population may not have enough food to eat; therefore, the coyote population may decrease.
- The coyote population may eat more of other types of animals in order to survive. This could impact other predators that depend on those animals for food.
- Or other plausible answers.